

REMARKS

Claims 1-20 are canceled. Claims 21-29 have been added. New independent structure claim 21 recites the subject matter of original independent structure claim 1 and includes all the limitations of original claims 2, 3, and 4. Applicants assert that new independent claim 21 is patentable over Feilchenfeld et al. (U.S. Patent No. 6,006,428). Nowhere does Feilchenfeld et al. teach or suggest a first and second conductive layer sealed to conductive material on the internal side wall of a substrate (plated through hole) by a metallurgical diffusion bond, as claimed by Applicant's new independent structure claim 21. Applicants direct the Examiner to column 5, lines 16-24 of Feilchenfeld et al., wherein it is described that plated through holes are capped. The copper plated through holes 26 and lands on the substrate surface to be capped are plated with gold. A sheet of copper is then plated with a gold and tin pattern of dots that match the position of through holes 26 on the multi-layer structure. The multi-layer structure and sheet are then aligned and laminated at a temperature of about 300-400°C. As a result, the gold plated through holes 26 and the gold tin dots are fused together. At this temperature it is well known that the tin in the dots melts (MP tin is 232 °C) and alloys with the gold in the dots and on the plated lands. The sheet is then subtractively etched to leave "man-hole" covers, that is pads over the plated through holes 26. As discussed above, the bond between the first and second conductive layers and the conductive metal on the internal side wall of the plated through hole of Applicant's new independent structure claim 21 is a metallurgical diffusion bond (also known as a diffusion weld). In a metallurgical diffusion bond two metals are pressed together at a sufficiently high pressure for a sufficient time and temperature for the metals to diffuse one into the other without melting or alloying. Diffusing bonding or welding is defined in the "ASM Metals Handbook", 2nd edition, ISBN 0-97170-654-7 (see Glossary of Terms, page 3) as "A solid-state welding process that produces coalescence of the faying surfaces by the application of pressure at elevated temperature. The process does not involve macroscopic deformation, melting, or relative motion of parts". An example of the process for forming the metallurgical diffusion bond or weld of the Applicant's claimed invention between two copper layers is described on page 9, lines 10-19 and includes laminating a copper foil (first conductive layer) to

the copper conductive material on the internal side wall of the plated through holes at a pressure in excess of about 1000 psi. at a temperature in excess of 330 °Celsius for a time in excess of about 60 minutes, most preferably using a pressure of about 1700 psi. at a temperature of about 365 °Celsius for a time of about 90 minutes. Referencing the "ASM Metals Handbook" (see table, page 113), described above, it is shown that the melting point of copper is 1085 °Celsius. Clearly, it is understood that Applicant's process conditions do not describe melting of copper. New independent structure claim 21 is thus patentably distinct from Feilchenfeld and is deemed allowable. New claim 22 recites the subject matter of original claim 5 and depends directly from new independent structure claim 21. New independent structure claim 23 recites the subject matter of original independent structure claim 6 and includes the limitations of original dependent claims 9 and 10, stated by the Examiner to be allowable. New dependent claims 24-29 recite subject matter of original dependent claims 7, 8, and 11-14, and depend directly or indirectly from new independent structure claim 23.

Support being fully provided for all the above amending, this amending does not constitute the addition of new matter and entry is urged.

Regarding the Restriction Requirement required by the Examiner under 35 U.S.C. 121, Applicants affirm the Restriction and have elected to prosecute the invention of Group I, original claims 1-16, drawn to a printed circuit board, classified in class 174, subclass 262. Applicants also submit that the provisional election orally made on May 13, 2002 was not made without traverse. The Examiner is in error when stating so.

With regard to the Restriction Requirement, Applicants respectfully submit that the subject matter of all claims 1-20 is sufficiently related that a thorough search for the subject matter of any one group of claims would encompass a search for the subject matter of the remaining claims. Thus, Applicants respectfully submit that the search and the examination of the entire application could be made without serious burden. See MPEP § 803, in which it is stated that "if the search and examination of the entire application can be made without serious

burden, the Examiner must examine it on the merits" (emphasis added). Applicants respectfully submit that this policy should apply in the present application in order to avoid unnecessary delay and expense to Applicants and duplicative examination by the U.S. Patent and Trademark Office.

Claims 4, 15, and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which Applicants regard as the invention. In response, Applicants have cancelled dependent claims 4, 15 and 16. Withdrawal of the rejection of claims 4, 15 and 16 is urged.

The Examiner objected to claims 10-14 as being dependent upon a rejected base claim (claim 6), but indicated these would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Applicants have cancelled all claims and have added new independent structure claim 23 which recites the subject matter of original independent structure claim 6 and includes the limitations of original dependent claims 9 and 10 indicated by the Examiner to be allowable. New dependent claims 24-29 depend directly or indirectly from allowable new independent structure claim 6. The objection being fully overcome, withdrawal is urged.

The Examiner rejected claims 1-9 and 15 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,006,428 granted to Feilchenfeld et al. As previously stated above, Applicants have cancelled all claims. New independent structure claim 21 recites the subject matter of original independent structure claim 1 and includes all the limitations of original claims 2, 3 and 4. Applicants have asserted above that new independent claims 21 is patentable over Feilchenfeld et al. New independent claim 22 recites the subject matter of original claim 5 and depends directly from new independent structure claim 21, deemed allowable. New independent claim 23, recites the subject matter of original independent structure claim 6 and includes the limitations of original claims 9 and 10 indicated by the Examiner to be allowable. New dependent claim 24 and 25 recite the subject matter of original claims 7 and 8 and depend from

new independent structure claim 23. Claim 15 is cancelled. It is respectfully submitted that this rejection is fully overcome by the amending provided herewith.

The Examiner rejected claim 16 under 35 U.S.C. 103(a) as being unpatentable over Feilchenfeld. Applicants have cancelled claim 16, as stated above. Withdrawal of the 35 U.S.C. 103(a) rejection is urged.

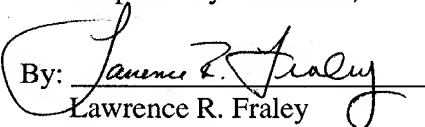
Regarding joint inventorship, as required by the Examiner, Applicants affirm that the subject matter of each claim in the instant application was commonly owned at the time the invention was made.

The Application is deemed in condition for allowance and such action by the Examiner is urged. Should differences remain, however, which do not place one/more of the remaining claims in condition for allowance, the Examiner is requested to phone the undersigned at the number provided below for the purpose of providing constructive assistance and suggestions in accordance with M.P.E.P. Sections 707, 707.07(d) and 707.07(j) in order that allowable claims can be presented, thereby placing the application in condition for allowance without further proceedings being necessary.

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Respectfully submitted,

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